

CLAIMS

1. A cache device for storing data received through a network as cached data and retrieving the cached data in response to a data request from a terminal to send the
5 cached data to the terminal, the cache device comprising:

a cache group table including group configuration information regarding a cache group composed of the cache device and other cache devices connected to the network, collaborative content control being carried out for the
10 cache group; and

controlling means for determining which data blocks are in a deletion pending status, the data blocks being data stored in the cache device, out of data blocks composing content based on the information included in the cache group
15 table, and for controlling the data blocks in the deletion pending status according to a deletion pending list composed of entries including information corresponding to the data blocks in the deletion pending status.

20 2. The cache device according to claim 1, wherein the cache group table includes an identifier of the content that is collaboratively controlled by the cache group, the number N of cache devices of the cache group, and group member numbers m assigned to respective cache devices; and

25 the controlling means determines which data blocks are

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in a deletion pending status, the data blocks being stored in the cache device, out of the data blocks composing the content, which is collaboratively controlled, that is,

the controlling means carries out the following process
5 based on a block offset number C serving as offset information, of a data block subjected to the determination, from the leading data block of the content to which the data block belongs:

C mod N is calculated;

10 V = N when C mod N = 0, and

V = (C mod N) when C mod N \neq 0; and

whether V = m is judged, and

the data block in question is judged to be one of the data blocks in the deletion pending status when V = m.

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3. The cache device according to claim 1, wherein

the controlling means judges, by exchanging messages between the cache devices, whether the collaborative control by the cache group is applicable to a data block

20 corresponding to an entry to be removed from an LRU list serving as a list for controlling data blocks stored in storage means; and

the controlling means generates the cache group table upon judging that the collaborative control is applicable.

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4. The cache device according to claim 1, wherein,
for a data block corresponding to an entry to be
removed from an LRU list serving as a list for controlling
data blocks stored in storage means,

5 the controlling means determines which data blocks are
in a deletion pending status, the data blocks being data
stored in the cache device, out of the data blocks composing
the content based on the information included in the cache
group table; and the controlling means controls the data
10 block, other than the data blocks in the deletion pending
status, in a free block list serving as a list for
controlling data blocks that can be deleted.

5. The cache device according to claim 1, wherein the
15 deletion pending list comprises a plurality of deletion
pending lists corresponding to priority, the data blocks
being stored in order of the priority; and
the controlling means judges the priority at which each
of the data blocks is stored, and registers an entry
20 corresponding to the data block subjected to the control in
one list selected from the deletion pending lists according
to the judgment.

6. The cache device according to claim 1, wherein,
25 when the data request from the terminal is for

acquiring a data block contained in the content that is collaboratively controlled by the cache group,

the controlling means judges which cache device of the cache group stores the requested data block, and retrieves
5 the data block from the cache device itself or other cache devices of the cache group according to the judgment.

7. The cache device according to claim 6, wherein the cache group table includes an identifier of the content that
10 is collaboratively controlled by the cache group, the number N of cache devices of the cache group, and group member numbers m assigned to respective cache devices; and

the controlling means carries out the following process based on a block offset number C serving as offset
15 information, of the requested data block, from the leading data block of the content to which the data block belongs:

C mod N is calculated;
V = N when C mod N = 0, and
V = (C mod N) when C mod N \neq 0; and
20 V = m, and

the data block is retrieved from a cache device having the group member number m that is calculated.

8. A method for controlling cached data in a cache device
25 for storing data received through a network as the cached

data and retrieving the cached data in response to a data request from a terminal to send the cached data to the terminal, the method comprising:

5 a step of determining which data blocks are in a deletion pending status, the data blocks being data stored in the cache device, out of data blocks composing content based on group configuration information, stored in a cache group table, regarding a cache group composed of the cache device and other cache devices connected to the network,
10 collaborative content control being carried out for the cache group;

a step of controlling the data blocks in the deletion pending status according to a deletion pending list composed of entries including information corresponding to the data
15 blocks in the deletion pending status.

9. The method according to claim 8, wherein the cache group table includes an identifier of the content that is collaboratively controlled by the cache group, the number N
20 of cache devices of the cache group, and group member numbers m assigned to respective cache devices; and

in the step of determining which data blocks are in a deletion pending status, the data blocks in the deletion pending status, the data blocks being stored in the cache
25 device, are determined out of the data blocks composing the

content, which is collaboratively controlled, that is,

the following process is carried out based on a block offset number C serving as offset information, of a data block subjected to the determination, from the leading data

5 block of the content to which the data block belongs:

$C \bmod N$ is calculated;

$V = N$ when $C \bmod N = 0$, and

$V = (C \bmod N)$ when $C \bmod N \neq 0$; and

whether $V = m$ is judged, and

10 the data block in question is judged to be one of the data blocks in the deletion pending status when $V = m$.

10. The method according to claim 8, further comprising:

steps of judging, by exchanging messages between the
15 cache devices, whether the collaborative control by the cache group is applicable to a data block corresponding to an entry to be removed from an LRU list serving as a list for controlling data blocks stored in storage means; and generating the cache group table upon judging that the
20 collaborative control is applicable.

11. The method according to claim 8, further comprising:

a step of determining which data blocks are in a deletion pending status, the data blocks being data stored
25 in the cache device, out of the data blocks composing the

content based on the information included in the cache group
table for a data block corresponding to an entry to be
removed from an LRU list serving as a list for controlling
data blocks stored in storage means; and controlling the
5 data block, other than the data blocks in the deletion
pending status, in a free block list serving as a list for
controlling data blocks that can be deleted.

12. The method according to claim 8, wherein the deletion
10 pending list comprises a plurality of deletion pending lists
corresponding to priority, the data blocks being stored in
order of the priority; and the method further comprising:
steps of judging the priority at which each of the data
blocks is stored, and registering an entry corresponding to
15 the data block subjected to the control in one list selected
from the deletion pending lists according to the judgment.

13. The method according to claim 8, further comprising:
steps of judging which cache device of the cache group
20 stores the requested data block, and retrieving the data
block from the cache device itself or other cache devices of
the cache group according to the judgment when the data
request from the terminal is for acquiring a data block
contained in the content that is collaboratively controlled
25 by the cache group.

14. The method according to claim 13, wherein the cache group table includes an identifier of the content that is collaboratively controlled by the cache group, the number N
5 of cache devices of the cache group, and group member numbers m assigned to respective cache devices; and

in the step of retrieving the data block, the following process is carried out based on a block offset number C serving as offset information, of the requested data block,
10 from the leading data block of the content to which the data block belongs:

$C \bmod N$ is calculated;

$V = N$ when $C \bmod N = 0$, and

$V = (C \bmod N)$ when $C \bmod N \neq 0$; and

15 $V = m$, and

the data block is retrieved from a cache device having the group member number m that is calculated.

15. A computer program for controlling cached data in a
20 cache device for storing data received through a network as the cached data and retrieving the cached data in response to a data request from a terminal to send the cached data to the terminal, the computer program comprising:

a step of determining which data blocks are in a
25 deletion pending status, the data blocks being data stored

in the cache device, out of data blocks composing content based on group configuration information, stored in a cache group table, regarding a cache group composed of the cache device and other cache devices connected to the network,
5 collaborative content control being carried out for the cache group;

a step of controlling the data blocks in the deletion pending status according to a deletion pending list composed of entries including information corresponding to the data
10 blocks in the deletion pending status.